CLAIMS

1. A process for producing hexafluoroethane, comprising a step of distilling a crude hexafluoroethane containing chlorine compounds each having two carbon atoms to distill out hexafluoroethane as a top flow from the top of a distillation column and separate a hexafluoroethane mixture containing said chlorine compounds as a bottom flow from the bottom of the distillation column, and a step of contacting said bottom flow with hydrogen fluoride in the gas phase at a temperature of 300 to 500°C in the presence of a fluorination catalyst to fluorinate said chlorine compounds.

2. A process for producing hexafluoroethane, comprising (I) a step of producing a crude hexafluoroethane containing chlorine compounds each having two carbon atoms, (II) a step of distilling said crude hexafluoroethane to distill out hexafluoroethane as a top flow from the top of a distillation column and separate a hexafluoroethane mixture containing said chlorine compounds as a bottom flow from the bottom of the distillation column, and (III) a step of contacting said bottom flow with hydrogen fluoride in the gas phase at a temperature of 300 to 500°C in the presence of a fluorination catalyst to fluorinate said chlorine compounds.

3. The process for producing hexafluoroethane as claimed in claim 1 or 2, wherein the chlorine compound having two carbon atoms contained in said crude hexafluoroethane is at least one compound selected from the group consisting of dichlorotetrafluoroethane, chloropentafluoroethane, 1-chloro-2,2,2-trifluoroethane, 1,1-dichloro-2,2,2-trifluoroethane and 1-chloro-1,2,2,2-tetrafluoroethane.

4. The process for producing hexafluoroethane as claimed in any one of claims 1 to 3, wherein the top flow contains at least 80 vol% of the hexafluoroethane

introduced into the distillation column.

5. The process for producing hexafluoroethane as claimed in any one of claims 1 to 4, wherein said fluorination catalyst is a supported or bulk catalyst comprising a trivalent chromium oxide as the main component.

6. The process for producing hexafluoroethane as claimed in any one of claims 1 to 5, wherein the molar ratio of the hydrogen fluoride to the hexafluoroethane mixture contained in said bottom flow (hydrogen fluoride/hexafluoroethane mixture) is from 0.05 to 10.

7. The process for producing hexafluoroethane as claimed in any one of claims 1 to 6, wherein the concentration of said chlorine compounds contained in said hexafluoroethane mixture is 1 vol% or less.

8. The process for producing hexafluoroethane as claimed in any one of claims 1 to 7, wherein said crude hexafluoroethane is a gas obtained by reacting dichlorotetrafluoroethane and/or chloropentafluoroethane with hydrogen fluoride in the gas phase in the presence of a fluorination catalyst.

9. The process for producing hexafluoroethane as claimed in any one of claims 1 to 7, wherein said crude hexafluoroethane is a gas obtained by reacting 1,1,1,2-tetrafluoroethane and/or pentafluoroethane, containing the chlorine compounds as impurities, with a fluorine gas.

10. The process for producing hexafluoroethane as claimed in claim 9, wherein the reaction with the fluorine gas is carried out in a gas phase in the presence of a diluent gas.

11. The process for producing hexafluoroethane as claimed in claim 10, wherein the diluent gas is a gas containing at least one of tetrafluoromethane, hexafluoroethane, octafluoropropane and hydrogen fluoride.

12. The process for producing hexafluoroethane as

claimed in claim 10 or 11, wherein the diluent gas is a gas rich in hydrogen fluoride.

13. The process for producing hexafluoroethane as claimed in any one of claims 9 to 12, wherein the reaction with the fluorine gas is carried out at a temperature of 250 to 500°C.

14. The process for producing hexafluoroethane as claimed in any one of claims 9 to 13, wherein the concentration of 1,1,1,2-tetrafluoroethane at the inlet of a reactor is 4 mol% or less in the reaction with the fluorine gas.

15. The process for producing hexafluoroethane as claimed in any one of claims 9 to 13, wherein the concentration of pentafluoroethane at the inlet of a reactor is 6 mol% or less in the reaction with the fluorine gas.

16. The process for producing hexafluoroethane as claimed in any one of claims 9 to 15, wherein the reaction with the fluorine gas is carried out under a pressure of 0 to 3 MPa.

17. The process for producing hexafluoroethane as claimed in any one of claims 2 to 16, wherein after removing acidic components from the gas obtained through said step (III), at least a part of said gas is re-circulated to the step (I) and/or the step (II).

18. A hexafluoroethane product comprising hexafluoroethane obtained by the production process claimed in any one of claims 1 to 17, in which the content of chlorine compounds each having two carbon atoms contained in the hexafluoroethane is 1 vol ppm or less.

19. A cleaning gas comprising the hexafluoroethane product claimed in claim 18.